AWA Newsletter

#46

October 2009

A Member of the SARL

Antique Wireless Association of Southern Africa

Inside this issue:

AWA Committee:

* President—Rad ZS6RAD
* Technical—Don ZS5DR
* Net Controller—Willem ZS6ALL
* Newsletter/PRO—Andy ZS6ADY

Reflections:

Have you ever noticed, put a whole lot of Radio Hams together and then listen to the conversations that spring forth.

They will vary in intensity from antenna installations to building of PC boards using microtechnology. But one thing that nearly all of them will have in common, is they will mostly centre around the great success stories.

Yes there are the occasional slips that will be brought in to account, but very seldom the actual let down of not being able to complete the project because of destroying half your test equipment, or because of making a stupid mistake that nearly took your lights out.

I suppose it really depends on the intellectual ability of the story teller and how much they are actually willing to divulge.

Often we will hear about the "smoke" that escaped, or the one or two wires that melted, but never really the whole story.

Unfortunately I am one of those intellectual genius' that has more failures than success stories to tell. For me to have a success story, is really a great achievement.

Having never really been schooled in electronics, I even have great difficulty reading an electronic drawing.

How do I cover it up ? Well there are a few select friends who have helped me out in times of dire straights after really screwing up a simple project. These friends however, live under threat of instant rejection, extreme pain from RF burns and absolute denial from my side should they ever repeat any of these hideous stories to another.

No doubt I am safe until they discover I am not capable of carrying out 33% of my threat due to not knowing how to induce RF burns, except on myself by accident.

Be that as it may, we will always have stories to tell of the successes and failures of Amateur Radio. Maybe it's what sets us apart as a group of likeminded individuals whose characters differ like chalk and cheese, yet whose ideologies and thinking will for the better part, remain the same.

Best 73

De Andy ZS6ADY

Wikipedia—The Capacitor

Instability Of Capacitance

The capacitance of certain capacitors decreases as the component ages. In ceramic capacitors, this is caused by degradation of the dielectric. The type of dielectric and the ambient operating and storage temperatures are the most significant aging factors, while the operating voltage has a smaller effect. The aging process may be reversed by heating the component above the "Curie point". Aging is fastest near the beginning of life of the component, and the device stabilizes over time. Electrolytic capacitors age as the electrolyte evaporates. In contrast with ceramic capacitors, this occurs towards the end of life of the component.

Temperature dependence of capacitance is usually expressed in parts per million (ppm) per °C. It can usually be taken as a broadly linear function but can be noticeably non-linear at the temperature extremes. The temperature coefficient can be either positive or negative, sometimes even amongst different samples of the same type. In other words, the spread in the range of temperature coefficients can encompass zero.

Capacitors, especially older components, can absorb sound waves resulting in a microphonic effect. Vibration moves the plates, causing the capacitance to vary, in turn inducing AC current. Some dielectrics also generate piezoelectricity. The resulting interference is especially problematic in audio applications, potentially causing feedback or unintended recording. In the reverse microphonic effect, the varying electric field between the capacitor plates exerts a physical force, moving them as a speaker. This can generate audible sound, but drains energy and stresses the dielectric and the electrolyte, if any.

CW Net:

The AWA CW net still happens every Saturday afternoon at 14:00 SAST.

I must say there are only 3 of us on frequency, but fortunately the guys who support the net are real diehards.

Om Barrie ZS6AJY has been doing CW for as long as I can remember and is so well known amongst the CW fraternity and QRP group. My thanks to Barrie for always being there and for standing in for me the times when I have not been able to make the net.

Om Pierre ZS6BB has also been involved in CW for many years and always kindly refers to the net as his CW "fix". Also a great QRP enthusiast, Pierre has been responsible for many of the CW activities on the air today.

Why do I mention these two CW'ers, well, because they are always there.

I know that John ZS6JBJ would so love to be there, but skip conditions tend to destroy his good intentions on a Saturday afternoon.

Now I know that I might get flack for mentioning these guys, because on the odd occasion there have been others who do come up on frequency, but Barrie and Pierre have been the stalwarts and have always encouraged me to keep the CW net running. I think, were it not for these two I would have given up on the net a while ago.

I do realise that band conditions have played a big part in the reduction of numbers on the bands and there are probably many more who would be there if they could be heard.

To those others who I know come up on frequency: John ZS5JON; Adrian ZS1TTZ thanks to all of you for being there and lets not give up on CW yet. I am sure it will still live longer than we do.

As the old saying goes, "May the Morse be with you"…….*73*

De ZS0AWA/CW …-.-

SSB activity:

And just when we thought conditions could not get any worse, they did. The last two Saturday morning SSB nets have been quite disastrous when it comes to Willem and myself being able to hear each other so as to be able to run the 80/40 relay effectively.

My apologies to the guys who have not had such good comms from 40m back to 80m, but this is the extent of how "skip" conditions have been affecting us.

One of the interesting things about the band is that 40m conditions to div2 are always excellent and then of course in the opposite direction to Dudley up there in Harare.

There were some rave reviews this last Saturday after two significant sunspots appeared on the surface of the sun. How long these will last, one never knows, and whether there will be any direct improvement, only time will tell. (Read the interesting Article on the Maunder Minimum on page 6).

Can we hope for light at the end of the tunnel , well I hope so ?

Despite all of these things being thrown at us, there is still a regular bunch of callers who keep the AWA strong and alive. We have never had less than 15 call in's on a Saturday morning, and I think this is a great testimony of what the AWA has achieved over the last few years it has been running.

Keep up the good work and I am sure we will soon see the results of our sticking it out in conditions where most others have already

Lafayette Receiver

AM:

The AM net has suffered too this month from inactivity and poor band conditions, but hopefully, with the 2nd lerg of the AWA Valve QSO party in the not too distant future, we will see a small surge in AM activity.

AM still seems to be one of those modes, maybe even more so than CW, which suffers from old age. There certainly are not that many activists left in SA who enjoy playing around on AM. Just as Amateur radio is suffering the consequences of the modern age of computer communication with VOIP and internet, so too AM has suffered even more from these modern wonders.

Yet if one looks in Europe and the US, there are still many operators who enjoy playing around on the mode and I have to wonder, with our drive to show more people about Amateur Radio and it's workings, if there may not be a few up and coming ardent AM enthusiasts.

Maybe I'm getting my hopes up, but one can only wish for these things to happen. There definitely is a certain romanticism around AM, that not all people share in.

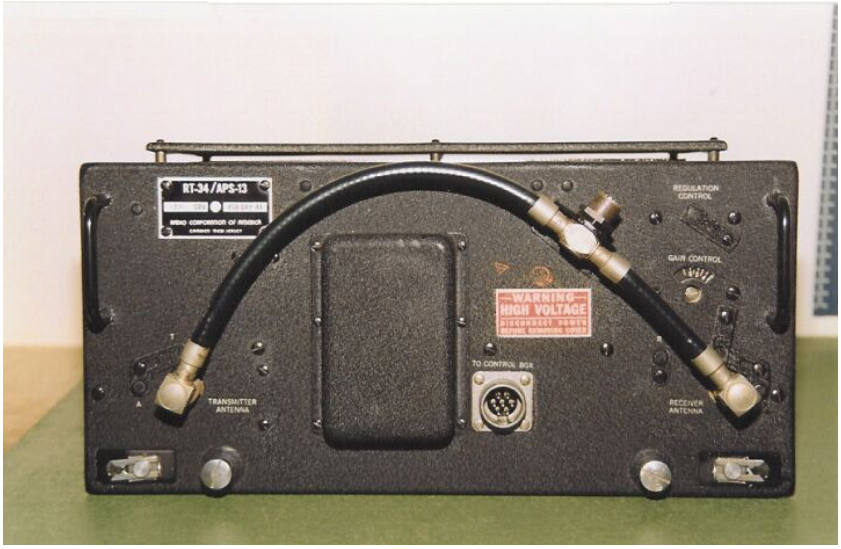
On the Collins AM night, once per month across the US, there are a few hundred stations that come up using AM, anchored by strong Net control stations. Lets face it, 1Kw of AM would certainly go a long way here, we may just cause a bit of interference to those broadcast stations operating on our frequencies.

RCA AR88 Receiver

The battle of the beams Part 4

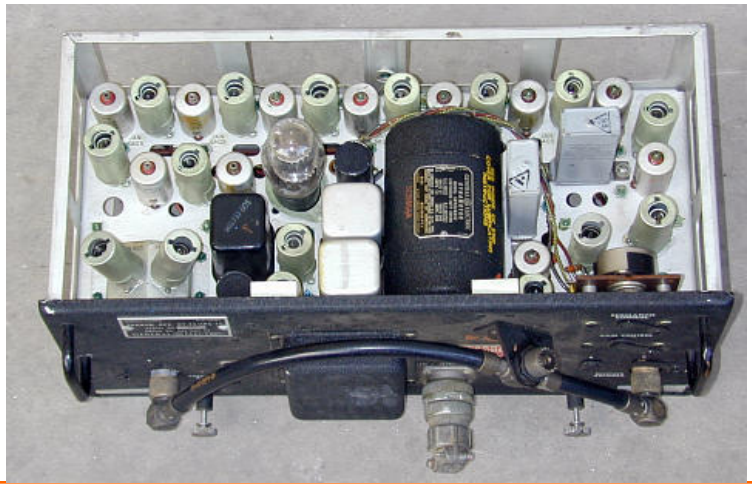
Electronic counter measures

During World War 2 both the allies and Germany developed many electronic aids to detect and confuse each other. One of the biggest problems was that radar and other systems carried on bombers could be detected by the enemy and used as a beacon to home onto. One of the most disastrous radar systems then in use was a tail-warning radar (TWR) fitted in the heavy bombers. "*Monica*" was a "range-only" tail-warning radar for bombers, introduced by the RAF in the spring of 1942. It operated at frequencies of 410 MHz to 420 MHz with an output power of 0,5W. It was an American built radar designated AN/APS-13. As the range closed the "beeps" in the pilot's headphones became faster, until when the range was down to 100 yards it became a continuous tone.



AN/APS-13 (Monica radar)
Note the coaxial cable linking the transmitter and receiver connectors. The T piece connected to the antenna. This unequal length cable provided a short across the receiver input when the transmitter was operational so preventing damage. The item shown was made by RCA.

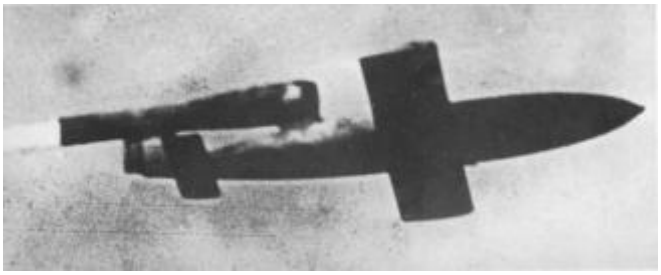
Unfortunately for the RAF, the Germans quickly developed a passive radar receiver, Flensburg (FuG 227 - Funk Gerat, meaning Radio Appartus), which was used by Luftwaffe night-fighters from Spring 1944 onward to home in on bombers using Monica. Monica-equipped aircraft suffered an increased casualty rate because of this and Dr Jones informed the RAF that the emissions were easy to pick up and to home onto, and the aircrews should switch off the equipment when not required. This did little to deter its use because aircrews believed that having Monica switched on provided extra protection. On the morning of 13 July 1944, a Junkers Ju 88G-1 night-fighter equipped with Flensburg mistakenly landed at RAF Woodbridge. After examining the Flensburg equipment, the RAF ordered Monica withdrawn from all Bomber Command aircraft. Later a modified version, the Monica IIIE, was fitted to Hawker Tempest V pursuit fighters and used with great success against the pilot-less V1 flying bombs during night sorties. The V1 flew at an altitude of 2,000 to 5,000 ft and attained a speed of 300 mph. The exhaust from the pulse jet engine showed up as a bright white tail of flame behind the aircraft.



AN/APS-13 (Monica radar) internal view
Transmitter on left, receiver on right. Motor-generator for high voltage in the middle. Note the antenna connector SO-239 T piece. Transmitter used 2 x 6J6 in push-pull.

In this role the Monica radar antenna pointed downwards and forward, the forward lobe was at 45-degrees so the radar could detect the low flying bombs below them. The Tempests circled at about 10,000 ft waiting for "customers" and when a V1 swept by underneath they dived steeply towards the V1, shot it down and climbed back to circle for the

next "customer". The Tempest was one of a handful of allied aircraft fast enough to catch the V1. Its top speed in a dive was over 500 mph (800 kph). Between June and August 1944 Tempests accounted for 638 V1s, the closest rival was the Mosquito with 428.



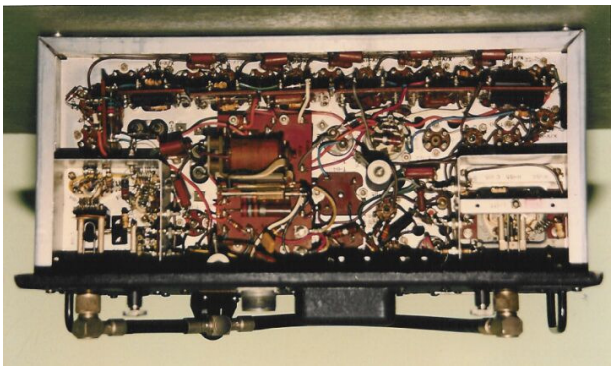
V1 flying bomb

Hawker Tempest V

The radar antenna is the dorsal fin below the wing.

An interesting use for the Monica radar was as a radio altimeter fitted to the atomic bombs dropped in Japan. This allowed an "air-burst" at several hundred feet above the ground giving a greater coverage area.

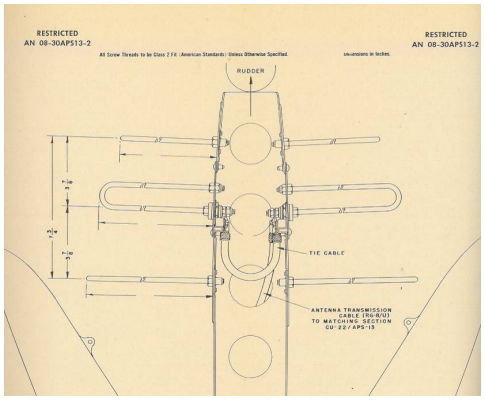
The allies also used emissions from the Wurzburg radar to detect them before they were in radar range. This UHF general coverage receiver was code-named "Boozer" (AN/APR-3) an American radar warning set that operated on 480 to 600 MHz.



AN/APS-13 bottom view

Another problem encountered was that friendly night fighters mingling with the bomber stream to provide protection had difficulty in distinguishing between friendly bombers, other allied fighters and marauding Luftwaffe night fighters. Unless a positive visual identification was made before firing the danger existed of shooting down one of your own aircraft, and this happened all too often. A transponder set was developed for fitting in the bombers and fighters (AN/APX-1). This was called "Identification Friend or Foe" (IFF). When a radar signal was picked up by the onboard IFF transponder it replied with a coded multi-digit message. This was a 5-digit number transmitted when a radar pulse was received. The other radar then sent back the same code to identify it is a "friendly" aircraft. The code was changed daily and the radio operator input the day's key code with rotary switches. If the radar pulse came from an enemy aircraft no acknowledgement code, or an incorrect code, would be send back to the bomber and hence it would be regarded as a possible "foe". There was still a problem with this system as the aircraft might have an equipment malfunction or the radio operator had forgotten to switch his set on, or input the incorrect code. But it was better than nothing!

Monica TWR antenna system, essentialy a 3-element Yagi facing rearwards.



Today IFF is more sophisticated and used in military and civil aircraft. The aircraft has a unique identification code and this appears adjacent to the blip on the ground radar display screen. In civilian aircraft this is known as "squawking". An air traffic controller might have difficulty separating two or more aircraft on his display so he will instruct an aircraft to "Squawk 7205" and the pilot dials in this number to the transponder and it appear next to his aircraft blip on the screen.

Later in the conflict the allies developed the H2S airborne bombing radar. This at first was 10cm radar looking directly down from the bomber which gave a high resolution display like a map. It could distinguish between

water and open farm land as well as buildings etc. The leader of the team at TRE for H2S was Dr Bernard Lovell, later to gain fame as the radio astronomer at Jodrell Bank, Cheshire. H2S used the new high power cavity magnetron, by now increased in power to over 100 kW, and this allowed the bombers to fly at very high altitude (40,000 ft) so largely avoiding anti-aircraft barrages. The Germans also quickly designed special receivers' code name "Liechtenstein" (SN-2), allowing the night-fighters to home onto the slow heavy bombers. (The Germans after the war was over told the allied scientists the H2S was a wonderful tool as they could track the bombers from the ground even with the Freya and Wurzburg radar systems blinded by allied jamming. They claimed that they were able to pick up the H2S transmissions as soon as the aircraft took off from the bases in England).

Again Dr Jones insisted the H2S should be switched off until the bombers approached the target area, by using the "J-switch". The J-switch was the main circuit breaker that supplied the H2S system. There was resistance to this amongst the aircrews, as they believed that having the H2S switched on provided protection. The worst casualties occurred when the night-fighters followed the returning bombers back to their bases and pounced on them as they were about to land. To have the H2S on when returning to base was suicidal. The top brass of the RAF heeded Jones warning and threatened to court martial any crew who disregarded the order to leave the H2S switched off until needed. Finally, total radio silence was achieved and the Germans lost a valuable tool. The allies meanwhile developed an airborne jammer to counter the Liechenstein threat called "Grocer", which was later used as a ground station "(Ground-Grocer") to lure Luftwaffe night-fighters into an ambush.

AWA VALVE QSO PARTY

When: Saturday 10th October AM: and Sunday 11th October SSB

Time: from 15:00 SAST to 19:00 SAST

Frequencies: 40m and 80m bands

Contest rules are in the SARL Blue Book

AWA Open Day and AGM

When: Saturday 17th October

Where: TAC at Rand Airport

Time: from 09:00

Flea Market: Antique Display: Cash Bar: Restaurant:

Museum: Static Aircraft Display

Bring the wife and kids and have a great day at the Transvaal Aviation Centre

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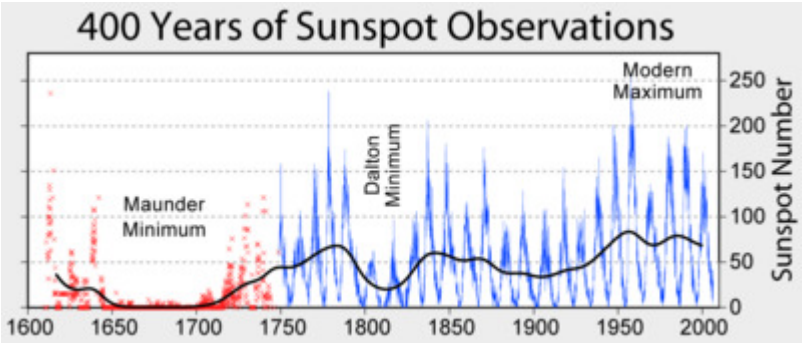
MAUNDER MINIMUM

From Wikipedia, the free encyclopaedia [thanks Tjerk, ZS6P]
The Maunder minimum in a 400-year history of sunspot numbers.



The Maunder Minimum is the name used for the period roughly spanning 1645 to 1715 by John A. Eddy in a landmark 1976 paper published in Science titled **"The Maunder Minimum"**,[1] when sunspots became exceedingly rare, as noted by solar observers of the time. Astronomers before Eddy had also named the period after the solar astronomer Edward W. Maunder (1851 – 1928) who studied how sunspot latitudes changed with time.[2] The periods he examined included the second half of the 17th century. Edward Maunder published two papers in 1890 and 1894, and he cited earlier papers written by Gustav Spörer. The Maunder Minimum's duration was derived from Spörer's work. Like the Dalton Minimum and Spörer Minimum, the Maunder Minimum coincided with a period of lower-than-average global temperatures.

During one 30-year period within the Maunder Minimum, astronomers observed only about 50 sunspots, as opposed to a more typical 40 000 – 50 000 spots in modern times.

Sunspot observations. The Maunder Minimum occurred between 1645 and 1715 when very few sunspots were observed. The total numbers of sunspots (but not Wolf numbers) in different years were as follows:

Year	Sunspots
1610	9
1620	6
1630	9
1640	0
1650	3
1660	Some sunspots reported by Jan Heweliusz in "Machina Coelestis"
1670	0
1680	1 huge sunspot observed by Gian Domenico Cassini

During the Maunder Minimum, enough sunspots were sighted so that 11-year cycles could be extrapolated from the count. The maxima occurred in 1676, 1684, 1695, 1705 and 1716.

The sunspot activity was then concentrated in the southern hemisphere of the Sun, except for the last cycle when the sunspots appeared in the northern hemisphere, too.

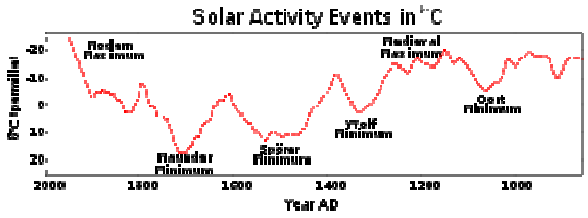
According to Spörer's law, at the start of a cycle, spots appear at ever-lower latitudes until they average at about lat. 15° at solar maximum. The average then continues to drift lower to about 7° and after that, while spots of the old cycle fade, new cycle spots start appearing again at high latitudes. The velocity of the sun’s rotation at various latitudes also affects the visibility of these spots:

Solar latitude	Rotation period (days)
0°	24.7
35°	26.7
40°	28.0
75°	33.0

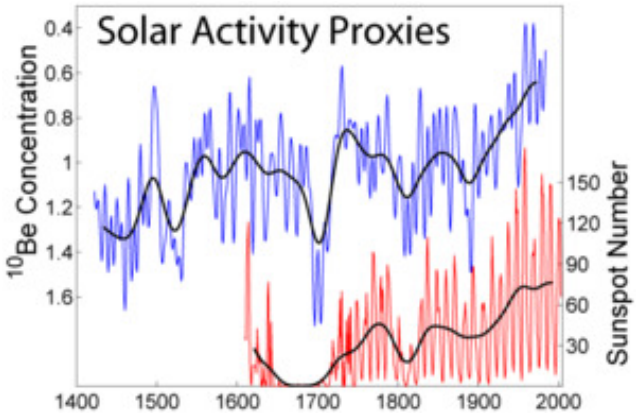
Visibility is somewhat affected by observations being done from the ecliptic. The ecliptic is inclined 7° from the plane of the Sun's equator (latitude 0°).

Little Ice Age.
The Maunder Minimum coincided with the middle, and coldest part, of the Little Ice Age, during which Europe and North America, and perhaps much of the rest of the world, were subjected to bitterly cold winters. Whether there is a causal connection between low sunspot activity and cold winters is the subject of ongoing debate (e.g., see Global Warming).

Other observations



Solar activity events recorded in radiocarbon.



Graph showing proxies of solar activity, including changes in sunspot number and cosmogenic isotope production.

Some scientists hypothesize that the dense wood used in Stradivarius instruments was caused by slow tree growth during the cooler period. Instrument maker Antonio Stradivari was born a year before the start of the Maunder Minimum.[3]

The lower solar activity during the Maunder Minimum also affected the amount of cosmic radiation reaching the Earth. The scale of changes resulting in the production of carbon-14 in one cycle is small (about 1 percent of medium abundance) and can be taken into account when radiocarbon dating is used to determine the age of archaeological artefacts.

Solar activity also affects the production of beryllium-10, and variations in that cosmogenic isotope are studied as a proxy for solar activity.

Other historical sunspot minima have been detected either directly or by the analysis of carbon-14 in tree rings; these include the Spörer Minimum (1450 – 1540), and less markedly the Dalton Minimum (1790 – 1820). In total there seem to have been 18 periods of sunspot minima in the last 8 000 years, and studies indicate that the sun currently spends up to a quarter of its time in these minima.

One recently published paper, based on an analysis of a Flamsteed drawing, suggests that the Sun's rotation slowed in the deep Maunder minimum (1684).[4]

During the Maunder Minimum auroras had been observed normally. Detailed analysis has been published by Wilfried Schröder[5] and J. P. Legrand *et al.*[6]

Curiously, the duration of the Maunder Minimum (1645-1715) coincides very closely with the reign of King Louis XIV of France (1643-1715), known as the Sun King.

The fundamental papers on the Maunder minimum (Eddy, Legrand, Gleissberg, Schröder, Landsberg *et al.*) have been published in *Case studies on the Spörer, Maunder and Dalton Minima*.[7]

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Who named the Maunder Minimum?
Whitehouse, David (December 17, 2003). "Stradivarius 'sound' due to Sun." *BBC News*. http://news.bbc.co.uk/2/hi/science/nature/3323259.stm. Retrieved 2009-05-12.
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Legrand, J. P.; Le Goff, M.; Mazaudier, C.; Schröder, W. (1992). "Solar and auroral activities during the seven-

teenth century". *Acta Geophysics and Geodetica Hungarica* 27 (2 – 4): 251 – 282.
Schröder, Wilfried (2005). *Case studies on the Spörer, Maunder, and Dalton minima*. Beiträge zur Geschichte der Geophysik und Kosmischen Physik. 6. Potsdam: AKGGP, Science Edition.

Further reading

Luterbach, J.; *et al.* (2001). "The Late Maunder Minimum (1675–1715) – A Key Period for Studying Decadal Scale Climatic Change in Europe". *Climatic Change* 49 (4): 441–462. doi:10.1023/A:1010667524422.
Willie Wei-Hock Soon; Yaskell, Steven H. (2003). *The Maunder minimum and the variable sun-earth connection*. River Edge, NJ: World Scientific. pp. 278. ISBN 9812382755.
What is wrong with the sun? (Nothing)

(This Article was originally published in the HF Happenings by Dennis Green)

Don's Technical Tip

Article 9. **Hum and Distortion**

Always suspect the PSU filter capacitors first but leakage between contacts on the tube bases and even between tubes has been known to produce these symptoms. Excessive heater to Cathode leakage can also be a cause. A good oscilloscope should show up the faulty area, (Just make sure that your oscilloscope can handle the voltages, otherwise your favourite scope will also need repair).

Sometimes the audio output tubes go soft or even the HT to these tubes goes low or the interstage capacitors are leaky or even break down, these are all things that can cause the dreaded hum or distortion.

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Antique Wireless Association of Southern Africa

Mission Statement

Our aim is to facilitate, generate and maintain an interest in the location, acquisition, repair and use of yester-days radio transmitters and receivers. To encourage all like minded amateurs to do the same thus ensuring the maintenance and preservation of our amateur heritage.

Membership of this group is free and by association.

Notices:

Swop/Sale:

1. We still have the AR88 RCA receiver for sale. Any interested partied please contact Andy ZS6ADY.

2. Rad ZS6RAD is looking for an SX42 Receiver for restoration. Anyone can help please contact Rad on 082 557 8459 or email him at rad.handfield-jones@pixie.co.za .

   This is what Rad is looking for:

3. Willie ZS5WI has a list of equipment for disposal from Om Peter ZS5XA, included in which is an FT707 and an FT101ZD. If you would like more information, please contact him at zs5wi@telkomsa.net for a full list, or on 0783519597. The list includes a tower, rotator, valves and various test equipment, a linear or 2 as well.